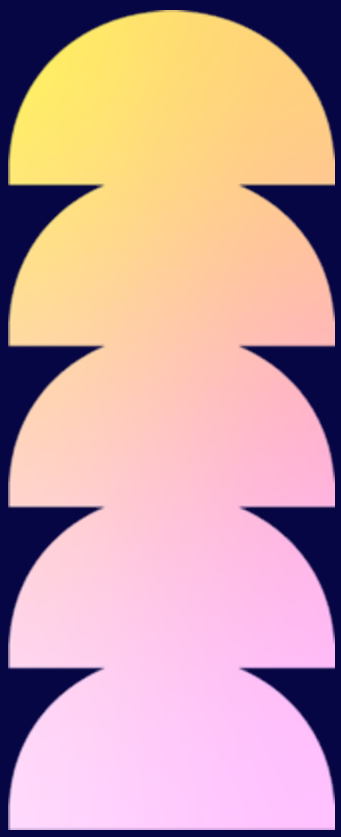

A Fair and Equitable Transition?

Tenants' experiences of decarbonising social housing

May 2025

The Open University
Y Brifysgol Agored
Wales Cymru

tai pawb
promoting equality in housing
hybu cydraddoldeb ym maes tai

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Mae'r ddogfen hon hefyd ar gael yn Gymraeg

Foreword

In 2021, Tai Pawb made a strategic commitment to advocating for an equitable response to climate change. We recognised the deep intersections between equality and environmental policy and we knew we had a responsibility to guide our members and influence policymakers toward low-carbon solutions that advance, rather than undermine, housing equality in Wales.

But we couldn't do this alone. This journey depends on collaboration with our members, with the communities we serve, and with those in power who shape policy and practice. If the commitment to decarbonising housing is to be truly transformative, it must be one that puts tenants first and does not further entrench existing inequalities.

To help build that foundation, we needed academic support. Our partnership with The Open University in Wales has been vital to this work, as has the funding we received through the Open Societal Challenges programme. This research is part of a much bigger journey one we are all on to embed fairness into climate action.

What makes this report unique is how it grounds policy discussion in the lived experiences of tenants. We brought marginalised voices to the table, and their insights and stories are at the heart of what follows. Their contributions shaped the research and its conclusions. At Tai Pawb, we believe that only by centring lived experience can we create sustainable, inclusive housing reform.

I heard much about the focus groups from the team, and the stories shared left a lasting impression. I heard how, in some cases, low-carbon technologies helped tenants lower their energy bills and regain a sense of control. But I also heard the flipside where poor design, lack of support, and inaccessible systems left people worse off, struggling with higher costs, damp homes, or unbearable summer temperatures.

The themes in this report are timely and widely relevant. They deserve the attention of policymakers, funders, and housing providers across Wales. We owe it to the tenants who contributed who shared not just insights, but stories of daily compromise, of resilience, and, at times, of having to choose between heating and eating to ensure their voices reach the highest levels of

decision-making. This report must inform the Just Transition Framework, help reshape retrofit practice, and guide future investment.

Finally, my heartfelt thanks to every participant for your time, your honesty, and your wisdom. I strongly encourage all those working in housing, climate, and equality to read this report carefully and to act on what it tells us.

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Executive Summary

The Research

The research explored social housing tenant's positive and negative experiences of transitioning to low carbon housing. As part of this, it considered the ways in which tenants reduce carbon emissions in the home and reasons for so doing. However, the key questions guiding the research were: how does decarbonised housing advance housing equality, and how does it exacerbate housing inequality? The research involved three focus groups involving 23 social housing tenant participants, and one focus group involving 11 policymakers and practitioners. Focus groups were carried out with tenant participants living in urban and rural areas in south Wales.

Policy background

'Decarbonising housing' is a policy priority in Wales and across the UK, as countries try to achieve a 95% reduction of carbon emissions by 2050, a legal requirement set out in the Climate Change Act 2008. The UK Committee for Climate Change believes that targets for reducing carbon emissions cannot be met without the decarbonisation of housing. Responding to these concerns, the Welsh Government introduced a unique programme called 'Optimised Retrofit Programme' (ORP), rolled out in 2020. The first phase of ORP was delivered to social and local authority housing, potentially reaching 230,000 homes.

There is a policy-wide view that decarbonising housing can alleviate issues associated with high energy costs, fuel poverty, and poor quality housing. However, the transition to low carbon housing is not an easy adjustment to make and can disproportionately affect vulnerable social groups and communities already experiencing inequality and can bring about new injustices. To ensure a fair and equal transition to low carbon society, Just Transition frameworks are developed that set out guiding principles to be embedded in low carbon policies. The Just Transition Framework for Wales is expected to be published in 2025.

Key Findings

Decarbonised housing measures can address inequalities around economic disadvantage, but this is largely dependent on the quality of housing support and provision

Tenant participants who moved into new social housing properties with solar panels already in place, struggled to use them and received inadequate housing support with how to register them. This resulted in higher energy bills. By comparison, tenant participants who lived in their home when new solar panels were installed, were able to use their solar panels quickly and effectively with follow-up housing support. This resulted in lower energy bills.

Damp and mould housing forces tenants to make difficult decisions around energy consumption

Damp and mould housing negatively impacts on tenant participants' quality of life. Decisions not to have the heating on and wearing layers instead, or using a tumble dryer to avoid drying wet clothes indoors, were all driven by the practical and economic challenges of living in damp and mould housing and the additional costs of heating homes that are thermally inefficient. Tenant participants who lived in older properties and had solar panels implemented benefited considerably from reduced energy bills, but some of those tenants still struggled with damp and mould and the ongoing challenges with managing that.

Decarbonised housing can exacerbate inequalities for disabled tenants

The current top-down system of delivery and standard model of retrofitting and implementation is not compatible with the access needs and requirements of disabled tenants. The lack of equitable response to decarbonising housing for disabled tenants prevented them from carrying out simple functions like opening and closing windows.

Decarbonised housing introduces new challenges with overheating during summer months

Tenants are experiencing issues with overheating due to retrofit measures which maximise air tightness and retention of heat. This disproportionately effects people with disabilities and existing health issues. Overheating can also increase the need for energy intensive appliances during summer months, and increase in energy costs therefore, as tenants try to manage room temperature with fans and air conditioning.

Recommendations

- **Housing Associations should channel effort and resource to support tenants using decarbonised technologies.** Reskilling dedicated workforce to provide adequate housing support with using decarbonised appliances will help tenants reduce carbon emissions in their home.
- **Community-led approaches should be designed to enable tenants to be involved in knowledge sharing and learning about decarbonised housing.** Tenants should have access to dedicated spaces where they can learn how to use solar panels, heat pumps and insulation measures.
- **The Welsh Government must provide regulatory guidance to housing associations on how to mitigate the risk of overheating.** The Welsh Government should also provide guidance on how overheating impacts health and energy consumption. It is further recommended that housing associations carry out equality impact assessment of overheating, examining how it can disproportionately impact tenants with disabilities and / or pre-existing health issues.
- **In lieu of a national Just Transition framework, it is recommended that the Welsh Government provides guidance and best practice examples of decarbonised housing models and approaches that are fair and equitable**. It is also recommended that housing associations ensure the diversity of tenant representation at consultation and

decision-making levels to help deliver fairer and more equitable response to decarbonised housing.

- **It is recommended that Welsh Government better distinguishes between the twin aims of making homes damp and mould free and decarbonising housing.** It is recommended that housing associations also distinguish between these two housing priorities. Damp and mould housing is a harmful environment to live in, especially for young children, and disproportionately impacts vulnerable social groups as they are more likely to live in poor quality housing. It is thus recommended that the policy aim to make homes damp and mould free, and necessary funds required, should be ring-fenced to ensure swift and effective solutions. Decarbonised measures such as insulation, ventilation and new windows can help to remedy issues with damp and mould, however, the goal to make homes damp and mould free must remain a priority.

1. Introduction

The Welsh Government must achieve a 95% reduction of carbon emissions by 2050, which is a legal requirement set out in the Climate Change Act 2008. Industry, agriculture, transport and the housing sector all have set 'net-zero' targets to reduce carbon emissions by 2050. 'Decarbonising housing' is now a policy priority in Wales and across the UK, whereby private landlords, homeowners and social housing associations must carry out key changes to reduce carbon consumption within the home.

Governments believe that decarbonised housing can alleviate issues relating to housing inequality. Some of the benefits of decarbonised housing are said to include improved energy efficiency, reduced energy bills, and fewer health problems associated with poor quality housing. However, transitioning to low carbon housing is not an easy adjustment to make, and can disproportionately affect vulnerable groups and communities already experiencing inequality and can bring about new injustices.

Vulnerable social groups currently experience the following issues with housing inequality and issues with household energy costs:

- in the UK, the lowest income group spend 7% of total expenditure on electricity and gas, compared to the highest income groups who spend 3.3%.[1]
- minority ethnic households, single-parents, and / or tenants with disabilities are more likely to struggle with paying their energy bills.[2]
- households in Wales are more likely to struggle with energy bills, compared to other UK regions.[3]

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[1] Office of Gas and Electricity Markets (Ofgem), 2024. 'Affordability and debt in the domestic retail market – call for input'. Available at: https://www.ofgem.gov.uk/sites/default/files/2024-03/Affordability%20and%20debt%20in%20the%20domestic%20retail%20market%20-%20call%20for%20input.pdf

[2] Office for National Statistics (ONS), 2023. 'Impact of increased cost of living on adults across Great Britain: July to October 2023'. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/articles/impactofincreasedcostoflivingonadultsacrossgreatbritain/julytooctober2023

[3] ONS, 2022. 'Impact of increased cost of living on adults across Great Britain: June to September 2022'. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/articles/impactofincreasedcostoflivingonadultsacrossgreatbritain/junetoseptember2022

- debt is a common concern for vulnerable social groups. In the UK the total value of household energy debt has more than doubled between 2018 and 2024. It currently amounts to £3.82 billion.[4]

This report sets out the main findings of a research study carried out in Wales, in 2024-2025. The key questions guiding this study are: how does decarbonised housing advance housing equality, and how does it exacerbate housing inequality? The findings of this report are based on three focus groups involving 23 social housing tenant participants, and one focus group involving 11 policymakers and practitioners in Wales. Focus groups were carried out with participants who live in urban and rural areas in Wales. Focus groups involving tenant participants broadly steered around positive and negative lived-experiences of decarbonised housing, implementation, support with technologies, diversity and inclusivity. Focus groups involving policymakers and practitioners steered around inclusivity, communication, trust and resource.

We would like to express our immense gratitude to everyone who participated in this study: for their time, expertise, humour and energy-saving advice. Our gratitude also goes to those who gave their time and practical support to make that participation happen, and to the many people we approached along the way who generously shared their time and expertise with us.

[4] Ofgem, 2024. 'Debt and arrears indicators Data'. Available at: https://www.ofgem.gov.uk/publications/debt-and-arrears-indicators

2. Climate change and housing

2.1 Net Zero Wales and housing

The Welsh Government is legally bound to reduce carbon emissions by 95% by 2050, which is in accordance with the Climate Change Act 2008. In 2019, Wales declared a 'Climate Emergency' and committed to bring forward the net zero emissions sooner than the 2050 target.[5]

The harmful and negative impacts of climate change on the home can include damage caused by storms, such as flooding, damage to the exterior windows and roofing, or thermal discomfort such as being too cold during extreme cold weather, or being too hot caused by extreme hot weather. Extreme weather conditions are now so frequent they are becoming normal, though the effects on communities and individuals are just as devastating and harmful every time they occur. At the time of this research being carried out, Wales was severely impacted by two storms occurring only two weeks apart.[6] The UK Committee on Climate Change (CCC), which is a statutory body set up to advise the UK and devolved governments on carbon emissions targets, identified 'buildings' as contributing 34% of the total UK carbon emissions in 2014.[7] Housing stock accounts for 14% of total UK greenhouse emissions, generated from fossil fuel consumption, mainly for spatial heating, electricity consumption for household lighting, electrical appliances, and electric heating. The CCC stress that major energy efficiency improvements of the housing stock are needed, and that we 'will not meet our targets for emissions reduction without near complete decarbonisation of the housing stock'.[8]

In 2010, the CCC advised governments that they must create renewable energy markets in order to 'deliver significant energy efficiency improvements in the UK

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[5] Welsh Government, 2021. 'Wales commits to net zero by 2050, but sets out ambitions to get there sooner'. Available at: https://www.gov.wales/wales-commits-net-zero-2050-sets-out-ambitions-get-there-sooner

[6] The UK Meteorological Office ('Met' office) issued a yellow weather warning for *Storm Bert* which significantly impacted South Wales in November 22nd – 24th 2024. Two weeks later the Met office issued a red weather warning for *Storm Darragh*, December 6th – 8th, 2024. For more information on the severity and impacts of these storms, you can visit BBC online, 2024. 'Met Office defends Storm Bert weather warning'. Available at: https://www.bbc.co.uk/news/articles/cm2v14d7rgeo

[7] UK Committee on Climate Change (CCC), 2014. 'Factsheet: Buildings'. Available at: https://www.theccc.org.uk/wp-content/uploads/2014/08/Fact-sheet-buildings-updated-July-2015.pdf

[8] CCC, 2019. 'UK housing: Fit for the future? February 2019' https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/

housing stock, including the insulation of 90% of lofts and cavity walls, as well as 2 million solid walls (from a total of nearly 8 million) by 2020', including the replacement of 13 million boilers ad heating systems that consume gas or oil. The magnitude at which these changes are being implemented cannot be operationalised without the supply chain, skilled workforce and technological provision put in place. Any issues in those key areas will inevitably and negatively impact on targets to lower carbon emissions and limit the options available to achieve its targets.

Decarbonising housing is a UK wide agenda, but devolved nations have different challenges and priorities that are specific to their geographical landscape, economies and demographics. In 2021, the Welsh Government developed 123 policies, outline in the *Net Zero Wales Carbon Budget 2 (2021-2025) Plan*, to mark 'a new phase in our decarbonisation journey with a new net zero target'.[9] More specifically, policies for the housing sector include optimising the thermal and energy efficiency by raising minimal standards for new buildings, decarbonising social housing, and facilitating behavioural change, i.e. reducing carbon emissions by behaving differently.

In 2015, the Welsh Government introduced the Well-being of Future Generations (Wales) Act, specifically to protect the interests of future generations.[10] Acknowledging that climate change effects are long-lasting and can take effect over a long period of time, the Welsh Government made it a legal requirement for public bodies, such as local authorities, the local health board and Welsh ministers, to embed sustainable development in all policy planning, and to ensure that the immediate needs of public bodies do not compromise the well-being of future generations. This Act was a landmark moment as it legislates for and imposes a statutory duty on how public authorities govern, with the view to safeguard and ensure justice for future generations on issues relating to climate justice, and planning for a low carbon society.

The Well-being of Future Generations (Wales) Act 2015 directly relates to the national *Just Transition Framework* for Wales, expected to be published in 2025. Just Transition Frameworks provide guidelines to help business, industry and the

[9] Welsh Government, 2021. 'Net Zero Wales Carbon Budget 2 (2021-2025)'. Available at: https://www.gov.wales/net-zero-wales-carbon-budget-2-2021-2025
[10] Welsh Government, 2015. 'The Well-being of Future Generations'. Available at: https://www.gov.wales/well-being-of-future-generations-wales

public sector make a fairer and greener transition to net zero across. In 2023-2024, the Welsh Government published it's Just Transition Framework consultation and responses, which acknowledges that transitioning to a low carbon future 'will affect every person in Wales and takes place against a background of pre-existing inequalities'.[11] The key purpose of Just Transition frameworks is to provide policymakers with information and guidance about how to deliver low carbon policies fairly and equitably, that can address pre-existing inequalities and avoid creating new barriers and inequalities. Making a fair and equitable transition to a low carbon society is a central feature of the Well-being of Future Generations (Wales) Act 2015, as it underlines the responsibility of public authorities to transition to low carbon in ways that protects and safeguards future generations against inequalities.

2.2. Decarbonising housing policy programmes

Wales is tasked with decarbonising 1.4 million homes, and the main route for achieving this is by improving thermal efficiency of the fabric of homes and switching from fossil-fuel appliances and heating systems to electric and renewable energy supplies and appliances. The term 'fabric first' is used in housing policy to describe the main approach to decarbonising homes which involves insulating loft space, walls and floors, and draught proofing with new windows and doors. Improving the fabric of the home is said to improve energy efficiency and reduce energy consumption by 20%.[12] The second approach to decarbonising housing is the installation of renewable energy supplies, such as solar panels that generate energy, and heat pumps which use electricity to heat and cool homes. All of these approaches can be described as a form of 'retrofit' or 'retrofitting' which involves 'the introduction of new materials, products and technologies into an existing building to reduce the energy needed to occupy

[11] Welsh Government, 2024. 'Consultation – summary of responses Just Transition Framework, June 2024'. https://www.gov.wales/just-transition-framework
[12] Welsh Government, 2019. 'Better Homes, Better Wales, Better World: Report to Welsh ministers from the Decarbonisation of Homes in Wales Advisory Group'. Available at: https://www.gov.wales/sites/default/files/publications/2019-07/independent-review-on-decarbonising-welsh-homes-report.pdf

that building'.[13] Retrofit is therefore used to describe the modifications made to homes, to reduce carbon emissions and improve energy efficiency.[14]

Penderi Project, Swansea

In 2019, Pobl housing association launched its own decarbonising and retrofit project in Swansea called 'the Penderi Project'. The Penderi project aimed to reduce carbon consumption and reduce the cost of energy bills across 644 homes across Penderi. It is the biggest decarbonising housing project in the UK, and was funded by the European Union, Pobl, and Western Power. Homes were retrofitted with solar panels and batteries, and accompanying technologies, as part of the 'solar share scheme'. The solar sharing scheme aimed to provide 60% of the community's energy needs. A smart home energy management system was also installed to monitor energy use and bill residents for the electricity consumed. Completed in 2023, results so far show that household energy bills have reduced by 20-30% and approximately 350 tonnes of carbon emissions have been saved.[15]

In 2020, Wales rolled out a unique programme to decarbonise housing called, 'Optimised Retrofit Programme' (ORP). In the Net Zero Carbon Budget 2021-2025, the Welsh Government state that ORP will 'maximise air tightness, eliminate thermal bridging, optimise insulation, solar gain and natural ventilation so reducing heat loss and making homes "fabric ready"'.[16] ORP was first rolled out to social and local authority households, potentially reaching 230,000 homes.

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[13] Technology Strategy Board (Innovate UK), 2014. 'Retrofit for the Future' Available at: https://assets.publishing.service.gov.uk/media/5a82135fe5274a2e87dc1041/Retrofit_for_the_future_-_A_guide_to_making_retrofit_work_-_2014.pdf

[14] In their report, 'The Fourth Carbon Budget – Reducing emissions through the 2020s', the CCC (2010) argue that replacing existing housing stock to reduce carbon emissions 'does not necessarily make sense from a carbon perspective' (p.203) because of issues with embodied carbon. Embodied carbon describes the greenhouse gases emitted in the making and manufacturing of goods to make the transition to net zero, such as the energy consumed in manufacturing new materials for insulation and solar panels etc, and for buildings construction operations. For more information and debates on embodied carbon, see Azari, R. and Moncaster, A. (eds.), 2023. *The Routledge Handbook of Embodied Carbon in the Built Environment (1st ed.)*. Available at: https://www.taylorfrancis.com/books/edit/10.4324/9781003277927/routledge-handbook-embodied-carbon-built-environment-rahman-azari-alice-moncaster

[15] Pobl Housing, 2023. 'Penderi Energy Project - What You Need To Know'. Available at: https://www.poblgroup.co.uk/penderifaq

[16] Welsh Government, 2021. 'Net Zero Wales Carbon Budget 2 (2021-2025)'. Available at: https://www.gov.wales/net-zero-wales-carbon-budget-2-2021-2025

However, in 2023, the Welsh Minister for Climate Change stated that 13,000 homes have so far been retrofitted under ORP, and cost approximately £260 million.[17] With its staggered roll out of ORP, the Welsh government claimed that it was adopting a 'test and learn' approach to decarbonising and retrofitting homes, to establish a strong evidence-base and learn from social rented and local authority rented households to inform its longer-term strategy about how to decarbonise housing in the private rented sector and owner-occupier homes.[18] The Welsh Housing Quality Standard (WHQS) sets out standards that housing associations must follow for decarbonising their housing stock.[19]

Wales faces some unique challenges with decarbonising its housing stock, mainly because it has the oldest and least thermally efficient housing compared to the rest of UK and Western Europe. It is estimated that 32% of all housing stock in Wales was built before 1919.[20] The Welsh Housing Conditions Survey 2017-2018, noted that detached households are the least energy efficient, whereas flats tend to be the most energy efficient - but only 11% of Wales housing stock are flats, which is comparatively less than England (20%) and Scotland (36%).[21]

Governments and local authorities rely heavily upon Energy Performance Certification (EPC) to set energy efficiency targets and for identifying which households require support with improving energy efficiency. Energy Performance Certificates (EPC) provide tenants and homeowners information about the energy performance of their household. In 2020, the UK Government set a target for 'as many homes [in England and Wales] as possible to achieve EPC band C by 2035'.[22] Initially, Wales government set targets for the social

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[17] Welsh Parliament, 2023. 'WQ89276 (e): How many houses have benefitted from the Optimised Retrofit programme to date?' https://record.assembly.wales/WrittenQuestion/89276

[18] Welsh Government, 2021. 'Guidance: Optimised RetroFit Programme' Available at: https://www.gov.wales/optimised-retrofit-programme#:~:text=ORP%20embraces%20a%20test%20and,Wales%2C%20Better%20World%E2%80%9D%20report.

[19] Welsh Government, 2024. 'The Welsh Housing Quality Standard 2023: Maintaining and improving social housing in Wales'. Available at: https://www.gov.wales/sites/default/files/publications/2024-06/welsh-housing-quality-standard-2023.pdf

[20] Welsh Government, 2019. 'Better Homes, Better Wales, Better World: Report to Welsh ministers from the Decarbonisation of Homes in Wales Advisory Group'. Available at: https://www.gov.wales/sites/default/files/publications/2019-07/independent-review-on-decarbonising-welsh-homes-report.pdf

[21] Welsh Government, 2020. 'Welsh Housing Conditions Survey 2017-18: headline report (updated)'. Available at: https://www.gov.wales/sites/default/files/statistics-and-research/2020-02/welsh-housing-conditions-survey-headline-results-april-2017-march-2018-update-570.pdf

[22] UK Parliament, 2024. 'Housing and net zero'. Available at: https://commonslibrary.parliament.uk/research-briefings/cbp-8830/#:~:text=Carbon%20emissions%20from%20homes,(such%20as%20solar%20panels)

housing sector to achieve the highest energy efficiency rating, EPC grade 'A', by 2033. However, this has since been lowered, and social housing dwellings are now required to meet a minimum EPC rating of 'C' by 2030 and social housing organisations are told to set their own strategic pathways for achieving EPC 'A' ratings.[23] Currently private registered landlords are under legal requirement to have a minimum EPC rating 'E', but must improve energy performance 'C' rating by 2030. It is illegal for landlords to lease their homes with an EPC 'F' and 'G' rating, unless a case for exemption has been registered where landlords cannot achieve the required rating due to, for example, high costs or building constraints. For all new housing development, Wales follows the two-stage guidelines set out in the UK's *Future Homes Standard*, introduced in 2019, the first stage requires that all new housing built from 2021 will be 30% more energy efficient than previous regulations; and the second stage requires that all new homes built after 2025 will be *highly* energy-efficient (EPC rating 'A' or 'B'), and have low carbon heating systems implemented such as heat pumps, solar panels, with district heating networks in place; ventilation and mechanisms for overheating; and accommodation for other adaptive technologies, such as support for charging electric vehicles.

However, there is some debate about whether EPC modelling can provide accurate information about the energy efficiency of a household or building. The UK Climate Change Committee (CCC), suggest that EPCs are not 'fit for purpose' because they provide an estimated not an accurate account of a household's energy efficiency.[24] Studies show that there are significant gaps in the energy efficiency ratings of buildings that have EPC ratings of 'F' and 'G', which are the lowest energy efficiency ratings. When using more accurate modelling systems to calculate energy used, buildings with an EPC rating of 'F' and 'G' are shown to be more energy efficient than EPC ratings estimate.[25] Until very recently, EPCs influenced policy decisions about energy efficiency, but in light of common concerns highlighted above, the UK Government recently released a consultation document, *Reforms to the Energy Performance of*

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[23]BBC online, 2022. 'Welsh government drops green target for social housing'. Available at: https://www.bbc.co.uk/news/uk-wales-politics-67217017

[24] CCC, 2023. 'Letter to Lee Rowley MP Reform of domestic EPC rating metrics to support delivery of Net Zero'. Available at: https://www.theccc.org.uk/wp-content/uploads/2023/02/CCC-Letter-Reform-of-domestic-EPC-rating-metrics-to-Lee-Rowley-MP.pdf

[25] Few, J., Manouseli, D., McKenna, E., Pullinger, M., Zapata-Webborn, E., Elam, S., Shipworth, D. and Oreszczyn, T., 2023. 'The over-prediction of energy use by EPCs in Great Britain: A comparison of EPC-modelled and metered primary energy use intensity'. Available at: https://www.sciencedirect.com/science/article/pii/S0378778823002542

Buildings regime which proposes multiple metrics to be used in addition to the EPC model. [26]

2.3 Housing, health and energy inequalities: making the links

Decarbonised housing is said to improve or address circumstances of housing inequality. Housing inequality encompasses many negative and involuntary situations such as, living in poor quality housing; being at risk of eviction and homelessness; being restricted to live in one type of housing or in a specific geographical area; and / or, experiencing discrimination from housing provider, landlord or mortgage provider.

Housing inequality is unevenly experienced across disadvantaged and minority populations who are likely to experience inequality in other key areas, such as education, employment, health and welfare. According to Wales Government, minority ethnic groups disproportionately live in poor housing quality, where issues with overcrowding and poor air quality are common.[27] A study by Tai Pawb reveals that damp and mould was a prevalent housing issue for ethnic minority groups in Wales.[28] The Bevan Foundation highlights that low-income groups face an acute shortage of good quality and affordable, leaving them with little choice but to live in poor quality housing – or seek homelessness assistance.[29] And the Equality and Human Rights Commission (EHRC) stress that there is a drastic shortage of accessible housing in Wales for disabled people, noting that disabled people are 'demoralised and frustrated by the housing system' (p.4).[30]

Poor quality housing can encompass many things but it generally means structurally inadequate housing that is in need of repair and is potentially

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[26]UK Government, 2024. 'Closed consultation: Reforms to the Energy Performance of Buildings regime'. Available at: https://www.gov.uk/government/consultations/reforms-to-the-energy-performance-of-buildings-regime/reforms-to-the-energy-performance-of-buildings-regime

[27] Welsh Government, 2022. 'Anti-racist Wales Action Plan: What we are going to do to make Wales anti-racist'. Available at: https://www.gov.wales/sites/default/files/pdf-versions/2022/7/3/1658919769/anti-racist-wales-action-plan-contents.pdf

[28] Tai Pawb, 2024. 'The experiences of housing in Wales of people from ethnic minority communities'. Available at: https://www.taipawb.org/news-story/report-the-housing-experiences-in-wales-of-people-from-ethnic-minority-communities/

[29] Bevan Foundation, 2023. 'Wales' Housing Crisis: Local Housing Allowance and the private rental market in Wales, Winter 2023'. Available at: https://www.bevanfoundation.org/wp-content/uploads/2023/03/Wales-Housing-Crisis-Winter-2023.pdf

[30] Equality and Human Rights Commission, 2018. 'Housing and disabled people: Wales's hidden crisis – Executive Summary'. Available at: https://www.equalityhumanrights.com/sites/default/files/housing-and-disabled-people-wales-hidden-crisis-executive-summary.pdf

unsafe. This also extends to damp and mould housing and housing that cannot be sufficiently heated due to low energy efficiency and poor insulation. According to the last Welsh housing survey carried out in 2017-2018, 7% of Welsh homes had issues with damp, mould and condensation, with most of those dwellings concentrated in the private rented sector (13%), followed by home-owner occupied (6%) and social rented (5%).[31] According to another study carried out by Shelter (2020), 32% of households in Wales have damp and mould, and have leaking roofs or windows. It further claims that one in three people in Wales live in unsafe or unaffordable housing, characterised by overcrowding, damp and mould, and / or low energy efficiency.[32]

The health impacts of living in poor quality and low energy efficient housing is exacerbated during cold weather months. According to Public Health Wales, 30% of excess winter deaths in the UK and 10% in Wales are attributed to living in cold homes.[33] Studies show that cardiovascular disease is more prevalent for those living in cold housing, and will therefore worsen during cold weather months.[34] Cold and difficult to heat homes can further lead to problems with bronchoconstriction, such as breathlessness, wheezing, fatigue, and coughing. Tenants living in housing with systemic issues with damp and mould, may experience reduced bodily resistance to respiratory infections, and therefore increase the risk of respiratory disease. Other associated health issues with low energy efficient housing are worsening conditions with arthritis and chronic inflammation, and tenants may experience having the cold or flu on multiple occasions, or on more than average occasions.[35] Children living in cold, damp and mould housing are more so vulnerable to respiratory-related health

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[31] Welsh Government, 2020. 'Welsh Housing Conditions Survey 2017-18: headline report (updated)'. Available at: https://www.gov.wales/sites/default/files/statistics-and-research/2020-02/welsh-housing-conditions-survey-headline-results-april-2017-march-2018-update-570.pdf This is the most recent housing survey carried out Wales, and does not provide a breakdown of demographic profile of social groups housed in those dwelling. To find out more about issues with Welsh household data, you can visit here: https://research.senedd.wales/research-articles/everything-we-don-t-know-about-housing-in-wales/

[32] Shelter, 2021. 'The right to adequate housing in Wales: the evidence base'. Available at: https://sheltercymru.org.uk/wp-content/uploads/2022/01/Alma-Economics-Back-the-Bill-Phase-1-Full-Report.pdf

[33] Azam, S., Jones, T., Wood, S., Bebbington, E., Woodfine, L. and Bellis, MA., 2019. 'Improving winter health and well-being and reducing winter pressures. A preventative approach'. Public Health Wales, Cardiff. Available at: https://phw.nhs.wales/news/winter-health-how-we-can-all-make-a-difference/report/

[34] Umishio, W., Ikaga, T., Kario, K., Fujino, Y., Kagi, N., Suzuki, M., Ando, S., Saeki, K. and Murakami, S., 2024. 'Effect of living in well-insulated warm houses on hypertension and cardiovascular diseases based on a nationwide epidemiological survey in Japan: a modelling and cost-effectiveness analysis.' Available at: https://bmjpublichealth.bmj.com/content/2/2/e001143

[35] Friends of the Earth and the Marmot Review Team, 2011. 'The Health Impacts of Cold Homes and Fuel Poverty'. Available at: https://www.instituteofhealthequity.org/resources-reports/the-health-impacts-of-cold-homes-and-fuel-poverty/the-health-impacts-of-cold-homes-and-fuel-poverty.pdf

problems, such as asthma. Children exposed to persistent damp and mould over a long period of time can trigger the onset of pneumonia and may even lead to death.

Awaab's Law

In 2020, in England, a two-year old child, Awaab Ishak, died from a respiratory condition caused by prolonged exposure to mould in his home. Awaab Ishak's death was preventable. In 2022, an inquest into Awaab's death found that Awaab's parents made several complaints to the social housing provider, Rochdale Boroughwide Housing, but they were ignored or racialised. On one occasion, the housing repairs team claimed that household mould was caused by the family's 'lifestyle and bathing habits'. After Awaab's death, his parents were forced to continue living in the flat because of unsuccessful rehousing applications, and whilst Awaab's mother was pregnant at the time.[36] Following the inquest, the Housing Ombudsman (England) led an investigation and found that 'a culture of "othering" of the residents' within Rochdale Boroughwide Housing.[37] Issues were also raised about the lack of government health and safety guidance on damp and mould housing, and following the inquest, the UK Government published *Health inequalities: Cold or damp homes*.[38] This guidance highlights that exposure to damp and mould can produce allergens and that excessive moisture can promote the growth of certain species of house dust mites, bacteria or viruses, but the more serious risks are related to respiratory illness, including: 'asthma development, asthma exacerbation, respiratory infections, upper respiratory tract symptoms, cough, wheeze and shortness of breath' (p.22).[39] The guidance makes several, albeit brief,

[36] Garden Court Chambers News, 2022. 'Awaab Ishak Inquest: Prolonged Exposure to Mould Led to Death' Available at: https://gcnchambers.co.uk/awaab-ishak-inquest-prolonged-exposure-to-mould-led-to-death/
[37] Housing Ombudsman Service (England), 2023. 'Special Report on Rochdale Boroughwide Housing'. Available at: https://www.housing-ombudsman.org.uk/wp-content/uploads/2023/03/P49-RBH-FINAL-200323.pdf
[38] Uk Government, 2023. 'Health inequalities: Cold or damp homes'. Available at: https://commonslibrary.parliament.uk/research-briefings/cbp-9696/
[39] Health inequalities: Cold or damp homes, UK Government, 2023. Available at: https://commonslibrary.parliament.uk/research-briefings/cbp-9696/

connections energy efficiency and net zero housing for addressing damp and mould housing.

In 2024, the UK Government introduced 'Awaab's Law' to improve the safety and quality standards of social housing in England, and will be implemented in stages, from October 2025 onwards.

Given the structural issues with poor quality housing, low-income social groups often struggle to heat their homes, because poor quality homes typically require more energy to heat, resulting in higher energy bills. Fuel poverty is the official term used to capture the combined experience of having a low-income, living in poor quality housing, and having high energy costs.[40] Households are said to be living in fuel poverty if they spend a higher than average portion of their income on energy bills in order to keep their home at a reasonable temperature and be comfortable. The Welsh Government estimates that 14% (196,000) of households in Wales are fuel poor.[41] However this data is not wholly reliable because it was gathered in October 2021, during the Covid-19 pandemic and before the increase in the energy price cap came into effect in April 2022. [42] Average household energy bills have increased by 54% as a result of the energy price cap increase in 2022, and, according to *National Energy Action* (NEA), 45% of households in Wales are currently experiencing fuel poverty, suggesting a much larger problem than Welsh government 2021 estimates.[43]

The official view within the UK and across Europe is that decarbonising housing can resolve issues with fuel poverty and mitigate the wider health inequalities

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[40] Models for measuring fuel poverty varies within the UK. England use the 'Low Income, Low Energy Efficiency' calculator (LILEE); Wales and Northern Ireland assess a household to be fuel-poor if it spends 10% or more of their household income on energy bills; Scotland determines a home to be fuel-poor if it spends more than 10% of its income on heating, with insufficient income left over to provide a good standard of living. For more details on fuel poverty and variations within and across the UK, you can visit:
UK Parliament, 2024. 'Fuel Poverty'. Available at: https://researchbriefings.files.parliament.uk/documents/CBP-8730/CBP-8730.pdf

[41] Welsh Government, 2022. 'Fuel poverty modelled estimates for Wales: as at October 2021'. Available at: https://www.gov.wales/fuel-poverty-modelled-estimates-wales-october-2021 At the time of writing this report, fuel poverty estimates for Wales and Northern Ireland have not been published for 2022 or years thereafter.

[42] At the time of writing this report, fuel poverty estimates for Wales and Northern Ireland have not been published for 2022 or years thereafter. For more information on this you can visit: UK Parliament, 2024. 'Fuel Poverty'. Available at: https://researchbriefings.files.parliament.uk/documents/CBP-8730/CBP-8730.pdf

[43] National Energy Action (NEA), 2022. 'Vulnerable households "left with no choices" as sky rocketing prices hit'. Available at:
https://www.nea.org.uk/news/vulnerable-households-left-with-no-choices-as-sky-rocketing-prices-hit/?_gl=1*msxv07*_up*MQ..*_ga*ODU2MjIyNDQuMTc0MzAwMTA1Ng..*_ga_VGRVTFGMVL*MTc0MzAwMTA1NS4xLjAuMTc0MzAwMTA1NS4wLjAuMA

that result from cold and thermally inefficient housing. The Welsh Government believe that decarbonising housing can eradicate fuel poverty, claiming that, 'decarbonisation of the housing stock will not only help the Welsh Government to realise its ambition to achieve net-zero emissions by 2050, but to eradicate fuel poverty in Wales' [44] Decarbonising housing is therefore entangled with the wider aim to eradicate fuel poverty and, for public health, reduce health-related problems associated that poor quality and energy inefficient housing. In its earlier carbon planning report, *Prosperity for All: A Low Carbon Wales,* the Welsh Government states that '[D]ecarbonisation offers enormous opportunities to create a vibrant and socially-just economy. We must make a difference and help create a society here in Wales that ensures well-being and tackles inequality as we decarbonise'.[45]

But different households have different needs and not every household will be able to adapt to the changes made to decarbonise homes and renewable energy technologies implemented. Decarbonising housing that is fair and equitable will prove challenging when carried out on such a large scale, and will depend on the meaningful consultation and inclusion of diverse housing groups, as well as the unique models of delivery that are available. Housing organisations will have little control over if they are outsourced. Another possible issue with decarbonising housing is the dominant focus on insulation and making homes warmer, which may result in households overheating, and becoming too warm during the summer months, especially as global temperatures are rising as a result of climate change.[46]

2.4 The Research

The research study was carried out between October and December 2024 and involved three in-person focus groups and one online focus group. Three focus groups were carried out involving a total of 23 tenant participants who live in social housing; and one focus group was carried out involving 11 policymakers and professionals from housing and homelessness organisations, tenant

[44] National Assembly for Wales (Senedd), 2020. 'Fuel Poverty in Wales'. Available at: https://senedd.wales/media/qygbplip/cr-ld13147-e.pdf
[45] Welsh Government, 2019. 'Prosperity for All: A Low Carbon Wales'. Available at: https://www.gov.wales/sites/default/files/publications/2019-06/low carbon-delivery-plan_1.pdf
[46] Sherriff, G., Butler, D. and Brown, P., 2022. ''The reduction of fuel poverty may be lost in the rush to decarbonise'': Six research risks at the intersection of fuel poverty, climate change and decarbonisation'. Available at: https://salford-repository.worktribe.com/preview/1563247/reduction-fuel-poverty-decarbonise.pdf

representative organisation, private rented standards organisation, urban design and planning, climate change (Welsh Government and local council) and independent think tank. The majority of participants were recruited through Tai Pawb membership network. Each tenant participant received a £25 shopping voucher.

Focus group questions were designed by the research team: Dr Vickie Cooper from the Open University and Rob Milligan from Tai Pawb, with input from Dr Freya Wise, a Research Fellow at the Open University and academic expert on retrofitting and carbon reduction. Tenant focus group questions asked about climate change effects on their home and community; measures adopted to reduce carbon in the home; positive and negative experiences of decarbonised changes made to tenants' homes; best approaches to being involved in decisions about decarbonising housing. Focus group questions with policymaker and professional participants asked about how can marginalised communities be more actively involved in the planning and implementation of decarbonising housing policies; how can trust be built between tenants, communities, and local authorities; and how can decarbonising measures and technologies be implemented and designed that responds to the needs and voices of tenants.

The demographic characteristics included age, sex, nationality, ethnicity, disabilities, physical impairments and / or mental health; as well as support and care given to others. The demographic profile and breakdown of the participant group is as follows: 68% were female and 32% male; 88% were White British; 3% Black British; 3% Arab British; 3% Asian British, and 3% White non-British; 35% had physical disabilities, physical impairments or mobility issues; and 43% had mental health conditions; 17% supported or cared for someone else.

Our research received favourable ethical approval from The Open University, Human and Research Ethics Committee (HREC) and was carried out in accordance with the organisational ethical principles of Tai Pawb.[47] All participants and organisations are anonymised, no participant or associated organisation is identified in the following findings sections.

[47] Tai Pawb, 'Our commitment: Working with People with lived experience.' Available at: https://www.taipawb.org/wp-content/uploads/2023/05/Lived-Experience-Principles.pdf

The research findings cannot be generalised due to the small sample size, though emerging themes highlighted in this report suggest that there may be common experiences of decarbonised housing shared across some tenant groups.

3. Findings

1. Reducing carbon and improving energy efficiency: ‘the only cleaning I do on my cooker is just wiping the dust off’

Our tenant participant focus groups began with approaches and measures adopted for reducing carbon emissions and improving energy efficiency within the home. All of our tenant participants revealed interesting habitual approaches to reducing energy-use in the home, and ways they monitor and try to reduce energy consumption. Below three tenants explain how their cooking routine and methods have changed, specifically to maximise efficiency, and reduce energy consumption:

> Because my oven is so low, I can’t bend to put stuff in, because I sit on my chair mostly in the kitchen, and I use the air fryer instead of the hob and microwave because it’s hard work for me. My oven, we had a new one when I moved in, I had a grant off the council for a new one [new oven], and I could choose which one I wanted but it was only electric I was allowed, and I hate electric, and I’m not used to electric because I find it just takes a lot longer to heat up than gas [cookers]. But I find the only cleaning I do on my cooker is just wiping the dust off.
>
> *Olivia*

> Honest to god, I just . . . because my kids are fussy, it’s micro meals for me. My daughter, she’s fussy, chicken nuggets and Alphabites. Chuck them in the air fryer, eight minutes, it’s done – but put them in the oven, you’re looking at 30 minutes while the oven warms up
>
> *Emma*

> For me, it's about timing. I mean, the only time I actually use my oven is to do jacket potatoes and pizza. I'm lucky I've got a big double air fryer, but they're the only two things [that are cooked in the oven].
>
> *Margaret*

Our research shows that tenants preferred using the air fryer to the cooker. As indicated above, air fryers offer more practical solutions for those living alone who may want to cook smaller meals, but also benefitted families where each member requires different meals. Tenant participants were furthermore aware of that air fryers use less energy than cookers. According to GreenMatch[48], a company that compares household appliances and methods for reducing energy consumption, an electric oven uses 2,000 – 5,000 watts, and an air fryer uses 1000 - 1,500 watts. In financial terms, using an air fryer can cost an average household 0.30p – 0.50p, compared to 0.60p - £1.50p for an electric oven.

Other tenant participants highlighted the benefits of using a dehumidifier when managing issues with damp and mould, and to maximise the heating efficiency of their homes. It is generally understood that homes with damp and mould can be difficult to heat, and that dehumidifiers can help homes retain heat by reducing the amount of condensation in the air. Two tenants below explain the benefits they experienced when using a dehumidifier:

> I do know how big that impact is when the property is actually damp, you know, that coldness is there all the time and then you put more heating in it and it's like kind of you can't see it working. So, once we bought a massive dehumidifier, which was a job to move it around and we put it on for two weeks and I think it was five litres or something like this.

[48] Greenmatch, 2022. "How Energy-Efficient Are Air Fryers? A Comprehensive Analysis." Available at: https://www.greenmatch.co.uk/

> And our heating has changed. So, the house was, the flat was very warm and much quicker heated up. So, I think they work very well towards reducing carbon and also to improve the lives of the tenants.
>
> *Sofia*

> I don't know why, but my bedroom did have a lot of [mould]... I don't open the window in the bedroom, so it did have quite a bit of mould around it, so I bought a dehumidifier, it's a big unit like this, and it was marvellous, you know, it was really good. And you'd be surprised how much water, I couldn't get over it, it was...you know, I left it on, you know, all day...
>
> *Grace*

Where energy appliances such as dehumidifiers and air fryers were acquired to maximise energy efficiency, several tenant participants explained that they took more radical action such as not having their heating on (unless absolutely necessary). It is clear that the decision not to have the heating on was predominantly influenced by economic factors and thermal efficiency, as opposed to reducing carbon. One tenant participant, Margaret, lives in a relatively new property, a flat, which she claims is thermally efficient. She does not turn her heating on because she can achieve a comfortable household temperature with her heating off, and explains below how she can further reduce energy consumption and lower her energy bills with additional approaches:

> I think because I've always been raised in a cold household: if it's too warm, I'm, well, I'm itching, and I go and stand and stick my head out the window because it's too warm. And that's even in the winter, I mean, at the moment [autumn], because I've got a combi boiler, to save energy, I switch it off, and I will wash in cold water because it's no different to washing in warm water. I actually, my thermometer has been saying 17.6

> degrees, and it's been a constant, even with my windows open and I left my front door open - even with that, with the continual airflow, it's been saying that (17.6 degrees) for the past two months. And I've not got my heating on, I've not done anything different. The only difference I've noticed was I actually had, when we got the cost-of-living payments, I actually treated myself and I bought myself a brand new carpet, and I had underlay this time. And that has made such a difference, actually, just that. I mean, I had carpet down before but I've noticed that my flat, well, my living area is a lot warmer. So just making those little tweaks to, yeah, I was lucky, I spent my money wisely and bought the carpet. If I do get cold, even with my windows open, just stick a blanket over me.
>
> *Margaret*

It is fair to conclude that Margaret above chooses not to turn her heating on because she lives in a thermally efficient property. However, the research found that tenants who lived in thermally inefficient housing and who had extensive issues with damp and mould, chose not to turn their heating on because it was very difficult to reach an adequate temperature. One tenant participant, Shirley, explains below that heating and ventilating damp and mould housing is not affordable:

> Shirley: Advisory…because of the damp, they expect us to keep the heating on a lot, obviously to keep it dry. But at the same time, you've got to keep your windows open and your vents open. Realistically, you can't do it, especially with the energy prices now. So to be honest, it's heavy curtains, carpets, but it is just trial and error with damp and mould…
>
> Interviewer:… and so winter, are you wearing layers?
>
> Shirley: Blankets, plenty of blankets, socks in bed, yeah, the lot.

As Shirley explains above, it is not economical for her to heat her home because it is thermally inefficient *and* she is advised to open the windows for ventilation,

for circulation of air – therefore bringing in cold air. Instead, Shirley does not have the heating on and tries to maintain some level of comfort with heavy curtains, carpets and blankets. Shirley's experience and approach was not unique. The research found that other tenant participants living in damp and mould housing also did not have their heating on. Below, participants share their experiences, methods and approaches with managing their homes with the heating off:

> Mine's not on: I rarely use the heating. I don't get cold and the kids don't get cold either, so it's only if, like, I used to have the heating on overnight to dry clothes, but I just use the tumble dryer now, so...
>
> *Olivia*

> It's cheaper to use the tumble dryer because I've got damp in the property, because [damp] means windows are open, which means heating on to dry clothes. But windows that are open isn't energy efficient. So for me, chucking it in the tumble dryer, you know, you get the condenser dryers and they're not that expensive to run, and it actually saves me on energy because the prices on gas are just increasing now. I think mine have gone up another 10%. So it's a lot of money to keep heating on in the winter and when you think about how long your heating's on, and your windows are open...it just makes more sense.
>
> *Shirley*

> I won't have to have the heating on in the winter as much, we're wearing extra layers, because I can't afford to put gas on. My tumble dryer's on more, so yeah, I am putting more carbon back into that, I'm guilty...
>
> *Emma*

According to the independent organisation, *Energy Saving Trust*, tumble dryers are energy intensive household appliances,[49] but participants above reveal that switching their heating on to dry wet clothing is also not energy efficient or affordable. Another issue with drying wet clothes indoors is that it can exacerbate issues with damp and mould because it generates condensation. Tenant participants above seem to understand this dilemma and use tumble dryers as a money-saving device, to avoid having the heating on, and as a preventative measure, to avoid generating more condensation in the home, which already has high condensation levels.

In summary, our research found that tenants were acutely aware of the ways they are reducing carbon in the home, and discussed lots of simple and technical approaches to improving energy efficiency. However, a lack of income and managing energy bills seemed to be the main driver of tenants' decisions about maximising energy efficiency. Decisions to use an air fryer instead of the cooker oven, not turning the heating on and wearing layers instead, and using a tumble dryer to avoid drying wet clothes indoors were all driven by the day-to-day economic decision making of low-income households.

Policymakers and professionals understand that tenants are already making significant trade-offs to manage their energy bills, and that the policy drive to reduce carbon emissions through behavioural change is therefore unjust and ineffective. One Think Tank professional explains below that it is unreasonable and ineffective to ask low-income households to reduce carbon emissions by changing their behaviour:

> …you're basically saying "hopefully people will wake up, understand the nature of the emergency that we're in and therefore act altruistically in their everyday lives and make their lives a little bit more difficult/worse in order to improve life for future generations". I'm not sure there's huge amounts of evidence that people are willing to do that at scale unfortunately, however much we might want that to be the case. You're expecting people [to

[49] Energy Saving Trust, 2022. 'What appliances use the most electricity?' Available at: https://energysavingtrust.org.uk/top-five-energy-consuming-home-appliances/

> voluntarily change] who have all these other trade-offs in their everyday life and they're struggling to get by and even heat their homes to a degree to not get really significantly ill - you're not going to be reaching them.
>
> *Dale, Think Tank professional*

As already demonstrated earlier in this section, tenant participants are making key decisions to balance their household budget, and the behaviours and techniques they are applying are not always by choice, but driven by the material reality of economic disadvantage - of having a low-income and living in thermally inefficient housing. Behavioural change for those tenants is not always a voluntary endeavour therefore but is driven by the need to save costs and manage energy bills. Whilst that may involve using more energy intensive appliances, like a tumble dryer, those decisions are still driven by economic disadvantage and inequality - of living in damp and mould housing, and drying clothes indoors without having the heating on and without adding to already high condensation levels in the home.

One housing professional participant, below, raises further issues around the disproportionate burden and responsibility put on low-income households to reduce carbon emissions, when it is likely that those households will use less carbon than affluent households, because they cannot afford to:

> I don't think there's many of our tenants would have the sort of huge carbon footprint that more affluent households would have, because ultimately their carbon usage, their carbon share is driven by shortage. And there is a big equalities issue in this, that's about that equal share and that equal responsibility for what we do. So, in terms of that, you know, those [low-income] households are being blamed for a problem that's not necessarily their own and that they're being asked to come up with the solutions and being able to drive that.
>
> *Rosie, Housing policymaker*

Policymakers were in agreement that the burden of reducing carbon consumption in the home should not fall on low-income tenants; they should not be made to feel responsible for individual behaviours and approaches to reducing carbon. Policymakers argue that low-income households consume less carbon than higher income households, and yet are made to feel responsible for climate change effects. Asking low-income households to reduce carbon emissions is furthermore problematic because low-income tenants are already making important decisions within the home, specifically to manage costs. As this section has shown, some tenants are not heating their homes in order to manage their household budget, which is more difficult for those living in damp and mould housing. These are difficult decisions and major trade-offs that are made, not to reduce carbon emissions or to respond to climate change, but to manage their household budget and avoid getting into debt.

The next section outlines tenant participants' experiences of living in decarbonised housing, covering both positive and negative experiences.

2. Experiences of decarbonised housing: 'Life changing' or 'setting it up to fail'?

Many tenant participants had their homes retrofitted but to different extents, with measures such as new windows and doors implemented to improve thermal efficiency, solar panels to provide a renewable source of energy, and heat pumps to limit fossil-fuel consumption. Our research found that participants' experiences of decarbonised housing was mixed. Some tenant participants expressed life-changing experiences, with significantly reduced energy bills, while others experienced significant setbacks, technical complications and even higher energy bills.

One tenant participant, Grace, explains below her overwhelming positive experience of having solar panels installed, and recalls a discussion she had with her housing officer after they were installed:

> He said, “how are the solar panels going?” and I said, “Oh, it’s made such a difference to my life.” I mean, my electric bill is half, you know, the amount of electric I put in, it’s half or less, it’s wonderful, you know. And it really has, for somebody who’s on a limited income, you know. Going from putting £40/£50 a week, which I was doing, and now £20 every three weeks.
>
> *Grace*

Another tenant participant, Emma, explains below that she had solar panels installed, and also experienced a significant reduction in her energy costs, but enjoyed additional benefits when she downloaded and used the smartphone solar panel application – ‘the app’:

> ….every morning you’d wake up, you’ve paid your standing order charge regardless, on pay-as-you-go, it’s a quid gone, straight away. But then doing the washing in the summer, I was, like, “Oh, I love this.” and I’d have my tumble dryer on, which used to cost me a fortune in the summer, whereas this year, I didn’t pay for any of it because I had the solar panels. It’s amazing, honestly. And yeah, with the app, you get a grid like that, and it shows you in the summer, what you’re getting from the grid, what’s going back to the grid, and how much is on your battery. My battery’s on 32%, and that’s in the winter.
>
> *Emma*

Both participants Grace and Emma above clearly benefited financially from having solar panels installed, but Emma benefited more so with the app as it gave her greater control about the optimal times to use energy intensive appliances, and how to read whether her electricity was sourced from the grid or her solar panels (storage battery). This allowed Emma to keep her energy bills to a minimum. But not all tenants had access to the app, and could not therefore maximise the full energy power and financial benefits of their solar panels. Grace claimed in our focus group discussion that she had no desire to

have a smartphone to access the app. Another tenant claimed she was 'waiting for [housing officer] to sort the app', which suggests that further support is needed with using and downloading and registering on the app, before tenants can reap the full financial benefits, and maximise the energy generated.

With the evidence above, participants appeared to have a positive and established relationship with their housing provider, and they further benefited from having a dedicated housing officer to support with the implementation of and access to changes implemented to decarbonise their homes. However, this positive experience and relationship was not the case for every tenant participant we spoke to. Our research found that other participants were left to navigate decarbonised technologies alone and were further disadvantaged by poor communication and negative relations with their housing provider. One tenant participant, Jenna, describes below the issues she has been having since she moved into a new social housing property, that is fully decarbonised with a heat pump and solar panels:

> The electricity is higher than the gas, the tanks, the water tanks, it's not really that practical because, I mean, sometimes you just want to take a shower and you have to...it's timed, you know? And even sometimes I feel like the solar power thing is not really working. I have an issue with my batteries always on standby, I don't see it doing a lot of things. The follow up [housing advice and guidance] was not done properly, so it affected the people who live there. We're paying higher bills, the hot water is not there all the time, the solar panels, I think are not working, so....
>
> *Jenna*

Jenna's high electricity costs were related to the fact that her solar panels and battery were not storing energy and feeding electricity into her home in the way they should. This was further complicated with ongoing issues she experienced with the solar panel app. A lack of support and delayed response from her housing provider appears to have added to the overall frustrating experience:

> We have to chase them up to make sure, because my bills were so high, the hot water, everybody was complaining from the hot water, they didn't know how to use this thing, they put the timer, and they already complained that they take a shower, like, 10 minutes, already the water is cold in the middle of the shower. And then they, you have to chase them up to get the information how to use things correctly, you have to chase them up to make sure that, "Is my solar power really working because it seems like it's not working?" You have to chase them up. There is an app you upload to check the solar power thing, I did upload it myself, tried to register, and then actually there is something was missing, like there is something was missing which they [developers] forgot to install, so that's why I couldn't register myself. I had to wait for a couple of months for someone to come and help me register, and make sure I got all the information regarding the battery and the usage and everything. And then when they uploaded it, there seemed to be something wrong again, so they have not instigated the panels itself. We've been in the property for a couple of months, and I feel like almost all the neighbours have the same issue, but not all of them raise the same issues, you know, like, pay attention to these details.
>
> *Jenna*

Jenna describes above that the housing support she received was fragmented and fractious, and when support was offered, it was inadequate. Altogether this impacted on Jenna's household finances, resulting in high very energy bills and failure to harness renewable energy from the solar panels.

Other tenants experienced similar issues as Jenna above. One tenant participant, Alfred, explains below the difficulties he experienced with his solar panels and housing provider:

> My brother is, he's an architect, and working for housing associations. First thing he said to me, "Well, where's your box in your attic?" I said, "Well, I haven't got a clue what you're on about". When I asked my housing association about it, it took me weeks to get to the bottom of it and it turns out that at the back of the solar panels, they've all got their individual transformers feeding into my box, I have no battery back - I've got no way of storing all that energy. And ironically enough, not even the housing association benefits from all that lost energy because, I mean, I might be wrong, but I've been told they're not registered to get the money back. Apparently you've got to be registered. Like if I owned my own home, I'd be able to benefit from it because I know you get money back. But apparently our housing association, for whatever reason, isn't registered. If you're going to put solar panels in, then they should be able to harness that energy because it would help to reduce bills and divert the power for something else...
>
> *Alfred*

Alfred lives in a relatively new property, approximately four years old, and has solar panels, but, as he explains above, he is not benefitting from the panels and only realised they were dormant and not storing energy when his brother came to visit. This suggests that Alfred was not adequately supported or informed by his housing provider about how to register or how use the panels. It was only through his brother's professional knowledge of solar panels and Alfred's persistence with his housing association that he was able to uncover the precise issue. Alfred's discussion of problems with getting money back, refers to the 'feed-in-tariff' which is when electricity suppliers pay registered solar panel users a fixed tariff for the electricity they generate and feed back into the national grid. Unfortunately it appears that no one was benefitting from the renewable source of energy or the feed-in-tariff, because Alfred's solar panels were not storing energy and were not registered.

On a related point, disabled tenant participants also highlighted that decarbonised housing measures rarely take into account the needs that disabled people may have in terms of design and accessibility. One tenant who is disabled explains below the challenges she has experienced with retrofit

measures and approaches, and the ongoing issues with catering to tenants with different needs:

> People with disabilities and mobility issues and really getting impacted just by general living, like: I'm too short, even if I stood up, to reach my windows. I've got to go outside to close them. I can't even open them. In all the planning stuff that I've heard, I'm never actually hearing how the accommodations with disability have been taken into account. It's like, you know, and I know disabled is a wide range. Trust me, I live it. I'm neurological disabled, physical, the whole lot in my house, and we all have different impacts and needs. But again, it's all the legislation always seems to come over as there is this perfect scenario, with this perfect tenant and this perfect house...
>
> *Martha*

Tenant participants were aware that their homes were part of the 'test and learn' phase of the Optimised Retrofit Programme (ORP) rolled out by the Welsh Government. As discussed in section 1.2 of this report, the 'test and learn' approach describes the first phase of ORP, which was rolled out across the social housing sector, before the private rented and owner-occupier sectors. The research found that some tenant participants felt that they were not properly included or consulted about the retrofitting measures and new technologies being implemented. In summary, some tenant participants felt as though they were 'done to', and treated 'like guineapigs':

> the most vulnerable [are] the most likely to be in social housing - we're the guinea pigs being tested for all these new rules, all these new policies, all these new implementations that are happening. It's like you're setting it up to fail for a lot of people. I'm already hearing stories where that's happening and it's like let's learn from that and I don't feel that they are right now.
>
> *Martha*

Martha makes interesting points about the setbacks caused by the 'test and learn' approach, where social housing tenants were the first group to experience retrofit measures on such an institutional scale. Her experience indicates a top-down system of implementation that resulted in issues surrounding a lack of diversity and accessibility, and inability to cater to disabled tenants' specific needs and requirements. This top-down approach appears to have been based on a standard model of delivery, the so-called 'perfect tenant', that is wholly incongruous with disabled tenants' needs and requirements, resulting in unequal living standards.

In summary, this section explored tenants' positive and negative experiences of decarbonised housing and retrofit measures. Tenant participants who expressed mostly positive experiences of decarbonised housing, similarly indicated a good relationship with their housing provider, where structured and technical support appeared to be in place to assist tenants with logistical arrangements around implementation and with follow-up technical support. Tenant participants with more negative experiences of decarbonised housing, also expressed difficult communications with their housing provider and lack of technical knowledge on decarbonised technologies. While this points to issues with the quality of housing support provided, there appears to be more systemic issues for disabled tenants who are still not being catered to. The top-down approach fails to meet the needs and requirements of disabled tenants.

This next section outlines the third main theme that emerged from our research, which is overheating.

3. Decarbonised housing and overheating: 'In the summer it's just crazy. It really is crazy'

Tenant participants' experiences of decarbonised housing cannot be simplified as either 'positive' or 'negative'. Our research found that experiences of decarbonised housing were dependent on the season. Tenants whose homes were retrofitted to improve thermal insulation, noted the benefits in winter months, but emphasised the disadvantages in the summer, claiming that it was unbearably hot and uncomfortable. Overheating in the home is becoming more so common and can be explained by global climate warming and frequency of heatwaves. However, experiences of overheating and extreme discomfort can

be made worse by thermal insulation measures in the home that maximise air tightness and heat retention. Below, two tenants explain their experiences with overheating in their homes in the summer months:

> Yeah, I mean, I live in a two-bedroomed fairly modern, four years old [property]. It is prefabricated, and I know that they've done extra things on the external walls for thermal [insulation] and all this. But I just can't cope with the heat. In the summer it's just crazy. It really is crazy
>
> *Alfred*

> We actually find it harder keeping cool in summer than we do with keeping warm in winter. We turn [heating] on as little as possible, if we can avoid it. If it gets too hot, that's when you have to turn on the air conditioning, that we've got. We don't cool the whole house, we have fans in the rooms in case we have to go into them, but we try to keep that sort of use to a minimum.
>
> *Alex*

Both tenants above expressed common issues with overheating and difficulty with staying cool in their homes during the summer months. This led those participants to purchase other electrical appliances to cool their home - such as fans and air conditioning - which consume household energy.

Overheating is especially difficult for disabled tenants and tenants with health conditions. Three participants explain below how overheating negatively impacts their health, quality of life and general discomfort within the home:

I've got COPD [chronic obstructive pulmonary disease], got liver disease, non-alcohol related, and arthritis. And yeah, for some reason, I mean, even now I'm cold and I'm starting to break into a sweat. It's like I can't regulate. I'm constantly having to take paracetamol just to regulate my temperature. So, of course in the summer, it's really bad. It's embarrassing because I am profusely sweating just moving around. So, I try and look for a shaded area or I have to put the electric fan on.

Alfred

When we had the heatwave and all that, we literally moved out into our back garden patio and lived in the gazebo because we couldn't stay indoors. Being disabled, it was hard for some of my members of the family to be able to cope with that at all. They were really, really ill, virtually bedbound. And people think, "Oh yeah, but we've got to make a house all nice and cosy for winter". And it's like, "Yeah, but I can't live in it then in the summer".

Alfred

Obviously when lockdown happened, with that, that was a really hot summer, wasn't it? I actually have got a fan. I had my empty ice cream containers full of water in the freezer, and when they came out, they were put in front of I actually have got a fan, to help me breathe. I mean, yeah, but then the fan will get in there, and then I'll have to switch it off, and then for a while...it's back on again.

Margaret

Margaret explains below that she has a chest related health condition that is made worse by the heat. This prompted her to purchase blackout curtains to prevent the sun from warming her flat and to remain cool during summer months:

> Yeah, I mean, I've got COPD now, and it's only been diagnosed in the last four years. So whether the weather does actually have an effect… this year it's been the worst year, because it's been warm and it's been wet.
>
> *Margaret*

Policymakers and professionals understand the issues with overheating. One climate change policymaker highlights the urgency of the issue below:

> …keeping properties warm in winter is much, much, much easier, but it's the extreme temperatures in the summer. Excess summer deaths is what we're going to be getting in the future, it really is. It's quite terrifying. Getting the design for new homes right now is really what my project is focusing on now, where you're actually designing to prevent overheating in summer.
>
> *David, Climate change policymaker*

As stated above, the issues with overheating during summer months is partly related to the retrofitting measures to improve thermal efficiency, which do not always take into consideration ventilation and / or shading. As David indicates above, this is a retrofit-design problem, and more intelligent designs must be utilised that can counter the negative impacts of air-tight insulating fabric when global temperatures are rising.

This study finds that some tenants whose homes have been decarbonised are at risk of overheating in summer months due to thermal insulation measures which increases air tightness and reduces ventilation. These thermal efficiency measures can make homes warmer in the winter, but too hot in the summer.

Conclusion and recommendations

Housing inequality is a negative situation experienced unevenly across different social groups. It is mainly marginalised and minority populations, such as young adults, old people, disabled people and /or minority ethnic groups who are likely to experience housing inequality. Governments believe that decarbonised housing can resolve issues with housing inequality, as well as reduce carbon emissions. Across Europe, there is a policy-wide view that improving energy efficiency with thermal insulation, and with renewable energy sources such as solar panels, will lead to reduced energy bills for low-income households and can also improve the health-related effects of living in poor quality housing. However, the transition to low carbon housing has the potential to disproportionately affect vulnerable social groups already experiencing inequality and can bring about new challenges and injustices.

This report sets out the key findings of a research study carried out in Wales in 2024-2025. The key questions guiding this study were: how does decarbonised housing exacerbate housing inequalities; and how does it address housing inequalities. The findings of this report are based on three focus groups, involving 23 social housing tenant participants; and one focus groups involving 11 policymakers and practitioners.

The main research findings and conclusions are as follows:

- **Decarbonised housing can address inequalities around economic disadvantage, but quality of housing support can affect this**

  This study finds that solar panels can reduce the cost of household energy bills, but not every tenant with solar panels installed can use them. Tenants who moved into social housing properties with solar panels already in place struggled to use them and received inadequate housing support and guidance with how to register and use them. This resulted in higher energy costs. By comparison, this research finds that tenants who lived in their home as new solar panels were installed, were able to use their solar panels quickly and effectively with follow-up housing support. These findings indicate that solar panels can reduce energy costs for low-income households, but housing providers need to be more proactive in the delivery of support and have sufficient technical knowledge to secure positive outcomes for tenants.

- **Damp and mould housing forces tenants to make difficult decisions around energy consumption**

  This research reveals that damp and mould housing negatively impacts tenant participants' quality of life. Decisions not to have the heating on and wearing layers instead, or using a tumble dryer to avoid drying wet clothes indoors, were all driven by the practical and economic challenges of living in damp and mould housing. Tenant participants who lived in older properties and had solar panels implemented benefited considerably from reduced energy bills, but some of those tenants still struggled with damp and mould, and the ongoing challenges with managing that.

- **Decarbonised housing can exacerbate inequalities for disabled tenants**

  This research finds that the current top-down system of delivery and standard model of retrofitting and implementation is not compatible with the access needs and requirements of disabled tenants. The lack of equitable response to decarbonising housing for disabled tenants prevented them from carrying out simple functions like opening and closing windows because they are not able to reach them. This suggests an incompatible design of insulation features that do not cater to disabled tenants' access needs and requirements. It is recommended that housing providers explore different models of delivery to advance equality of opportunity for disabled tenants, and involve disabled tenants more in the decision-making and delivery of decarbonised measures.

- **Decarbonised housing introduces new challenges with overheating during summer months**

  This research finds that tenants are experiencing issues with overheating due to retrofit measures which increase air tightness and retention of heat. This disproportionately effects people with disabilities and existing health issues. Overheating can also increase the need for energy intensive appliances during summer months - and potentially increasing energy costs therefore - as tenants try to manage room temperature with fans and air conditioning.

  This research involved participants from ethnic minority backgrounds, however there was not enough evidence to conclude how decarbonised

housing positively or negatively impacts on this groups' particular experience of housing inequality.

The research findings cannot be generalised due to the small sample size, however, emerging themes highlighted in this report suggest that tenants may share some of the experiences of decarbonised housing.

Recommendations

1. **Improve housing engagement and outreach.**

   This research finds a correlation between the quality of housing support and outcomes of decarbonised housing for tenants. Tenants provided with good quality housing support and dedicated housing staff helped them use decarbonised technologies, which resulted in reduced energy costs. Poor housing support resulted in tenants not being able to use their solar panels and other decarbonised technologies, which led to higher energy costs for those tenants.

   - It is recommended that housing associations gather evidence of its decarbonised housing stock, to understand how or if tenants are using decarbonised technologies. A redistribution of housing organisational efforts and resource is recommended to understand how or if tenants are using decarbonised technologies, and reskilling of dedicated workforce to comprehend any issues and provide adequate support as required. This will maximise efforts to reduce carbon emissions within the home, and help tenants reduce energy costs.

2. **Create community-level champions and knowledge sharing forums.**

   This research finds that there is a need for greater community-level, tenant involvement, to share knowledge, learning and understanding about reducing carbon emissions in the homes, and using decarbonised technologies:

   - It is recommended that more community-led approaches be facilitated, where tenants can be involved in, or help steer, spaces for knowledge sharing and learning about decarbonised housing. A space where tenants can learn how to use solar panels, heat

pumps and insulation measures is recommended. Given issues with uneven experiences of decarbonised housing raised in this study, a focus would also need to be on creating diverse community champions who can connect with a range of tenants in ways that is fair and equitable.

3. **Evidence the risk of overheating and equality impact.**

   This research finds that tenants living in decarbonised housing are overheating in summer months, and that this disproportionately impacts disabled tenants and tenants with existing health issues.

   - It is recommended that the Welsh Government issue regulatory guidance on how to mitigate the risk of overheating in summer months. Welsh Government need to provide guidance on how overheating impacts on health and energy consumption as tenants are likely to consume more energy to reduce indoor temperatures. It is further recommended that housing associations carry out equality impact assessment of overheating, examining how overheating impacts on disabled tenants and tenants with pre-existing health issues.

4. **Deliver more equitable responses for protected groups.**

   This research finds that decarbonised housing measures and the current top-down approach fails to cater to the needs and requirements of tenants with protected characteristics. The research finds that disabled tenants and tenants with ongoing health issues experienced reduced quality of life, due to decarbonised housing measures that fail to cater to their needs and requirements.

   - In lieu of a national Just Transition Framework (expected to be published in 2025), it is recommended that the Welsh Government provides guidance and best practice examples of decarbonised housing models and approaches that are fair and equitable. It is further recommended that housing associations ensure the diversity of tenant representation at consultation and decision-making levels to help deliver fairer and more equitable responses to decarbonised housing.

5. Prioritise damp and mould housing.

Approximately 20% of tenant participants in this research variously experienced issues with damp and mould housing. While no participant gave evidence about the health impacts of living in damp and mould housing, our research shows how damp and mould housing negatively effects tenant participants' quality of life – such as not having the heating on to manage high energy costs, wearing layers in cold weather months, and having persistent damp walls:

- It is recommended that the Welsh Government better distinguishes between the twin aims of making homes damp free and decarbonising housing. It is recommended that housing associations also distinguish between these two housing priorities. Damp and mould housing is a harmful environment to live in, especially for young children, and disproportionately impacts vulnerable social groups as they are more likely to live in poor quality housing. It is thus recommended that the policy aim to make homes damp free, and necessary funds required, should be ring-fenced to ensure swift and effective solutions. Decarbonised measures such as insulation, ventilation and new windows can help to remedy issues with damp and mould, however, the goal to make homes damp free must remain a priority.

Tai Pawb

Tai Pawb is a Welsh equality and housing charity, working at the intersection of policy, practice, and lived experience. It brings people and knowledge together to drive change on systemic housing inequalities in Wales.

Tai Pawb is Wales-focused by design, working across the country to support housing providers, local authorities, and communities to embed equality, diversity, and inclusion. Through its policy work, consultancy, training, and lived experience engagement, Tai Pawb aims to improve housing outcomes for all, especially marginalised and underrepresented groups.

Keep the conversation going at **info@taipawb.org**

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